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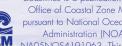
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Dear Coastlines Reader,

Welcome to *Coastlines*, the annual magazine of the Massachusetts Office of Coastal Zone Management (CZM). This edition focuses on "Smart Growth," a concept that has gained much state and national attention over the last few years. What, exactly, is Smart Growth? Smart Growth includes many elements with the overall goal of promoting better development and land use practices that make sense from an environmental, cultural, and economic perspective. Sprawling subdivisions and roadways lined with strip malls eat up extensive tracks of land, spread people out, add to commuting times, and erode our sense of community. Throughout eastern Massachusetts these growth patterns have irrevocably changed cities, towns, and landscapes. The good news is that many people, using common-sense approaches, have found alternatives that are good for communities and the environment.

You may still be wondering, what does Smart Growth have to do with coastal zone management? Well, the number one coastal pollution problem comes from the land. It's called nonpoint source pollution—the accumulated contaminants collected when rain and snowmelt run over lawns, roadways, farm fields, and other developed surfaces, picking up soil sediments, nutrients from fertilizers and sewage, and chemicals from pesticide use and other sources. This contaminated runoff ultimately flows to the sea or another water body. Smart Growth offers tremendous tools to combat this problem, leaving forest land and fields to slow and filter the runoff, while using practical techniques to minimize contaminants introduced to the environment.

The emerging and proven solutions presented in this edition of *Coastlines* are truly exciting, as is CZM's opportunity to work with so many inspired individuals and organizations to meet the Commonwealth's continually growing needs for housing, infrastructure, and economic opportunity, while maintaining a sense of culture and community, a healthy environment, and clean coastal waters.

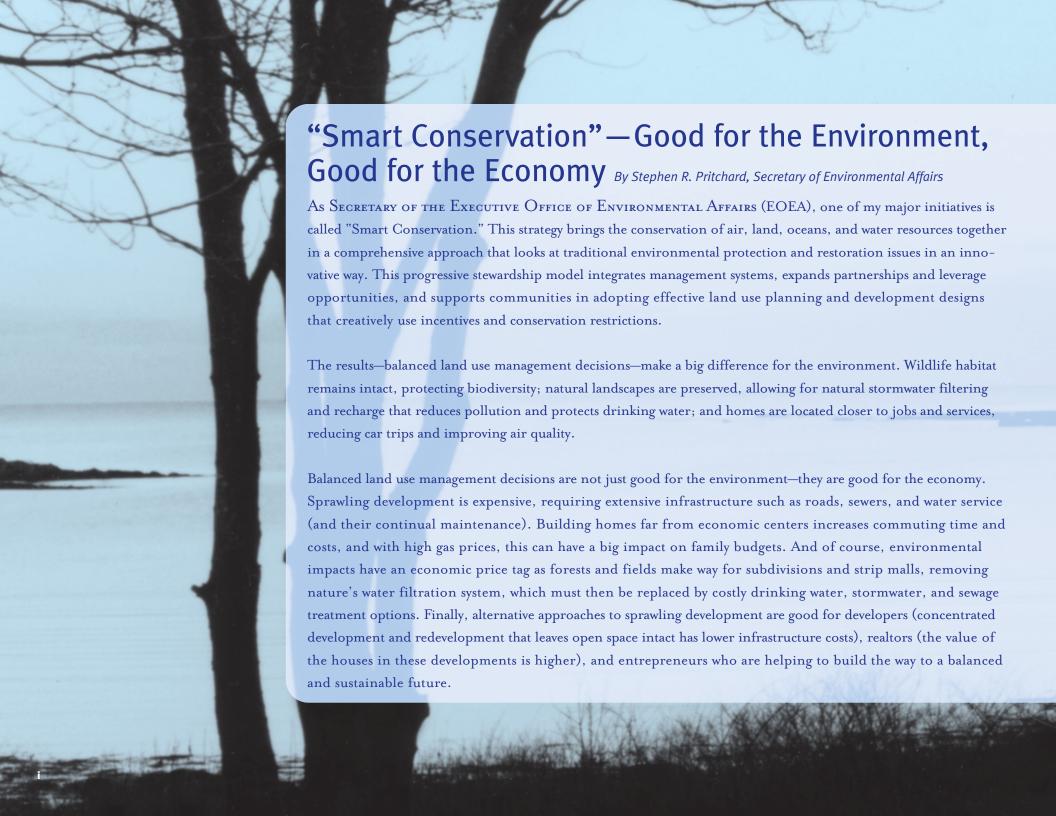
For more on Coastal Smart Growth and other CZM initiatives, see www.mass.gov/czm, or sign up for CZM's monthly electronic newsletter, CZ-Mail, at www.mass.gov/czm/czmail/currentczmail.htm [to request printed copies, call the CZM Information Line at (617) 626-1212]. And, as always, please feel free to contact us with suggestions so we can better provide you with information in the future.

Sincerely,

Susan Snow-Cotter

Susan Snow-Cotter

Director, Massachusetts Office of Coastal Zone Management



The Coastal Smart Growth Program, which is featured in this edition of *Coastlines*, was built as part of my "Smart Conservation" initiative. The Smart Growth Program focuses on promoting Open Space Residential Design (OSRD), Low Impact Development (LID), and other techniques that you will read about in the pages that follow. These techniques use planning, design, and natural landscapes to protect the environment, while lowering development costs. This EOEA/CZM partnership has been extremely successful. Highlights include:

- The release of the Massachusetts Smart Growth Toolkit, which provides local officials and the business community with new methods to guide and promote sustainable and environmentally sound development and growth. (See http://www.mass.gov/envir/sgtk.htm)
- The LID Working Group, a statewide public-private partnership of local, state, and federal agencies; environmental organizations; regional planning agencies; and representatives from planning, engineering, law, and development firms. The group is pooling financial and technical resources to develop technical manuals and fact sheets, regulatory models, and associated outreach materials that promote LID.
- The adoption of dozens of local bylaws that promote OSRD, LID, and similar "smart growth" techniques in communities across the Commonwealth.

Through these efforts, "Smart Conservation" is a real win-win—benefiting the environment and the economy and improving the quality of life in Massachusetts, today and in the future. I hope you will find these tools and articles useful.

Sincerely,

Stephen R. Pritchard

Secretary, Executive Office of Environmental Affairs



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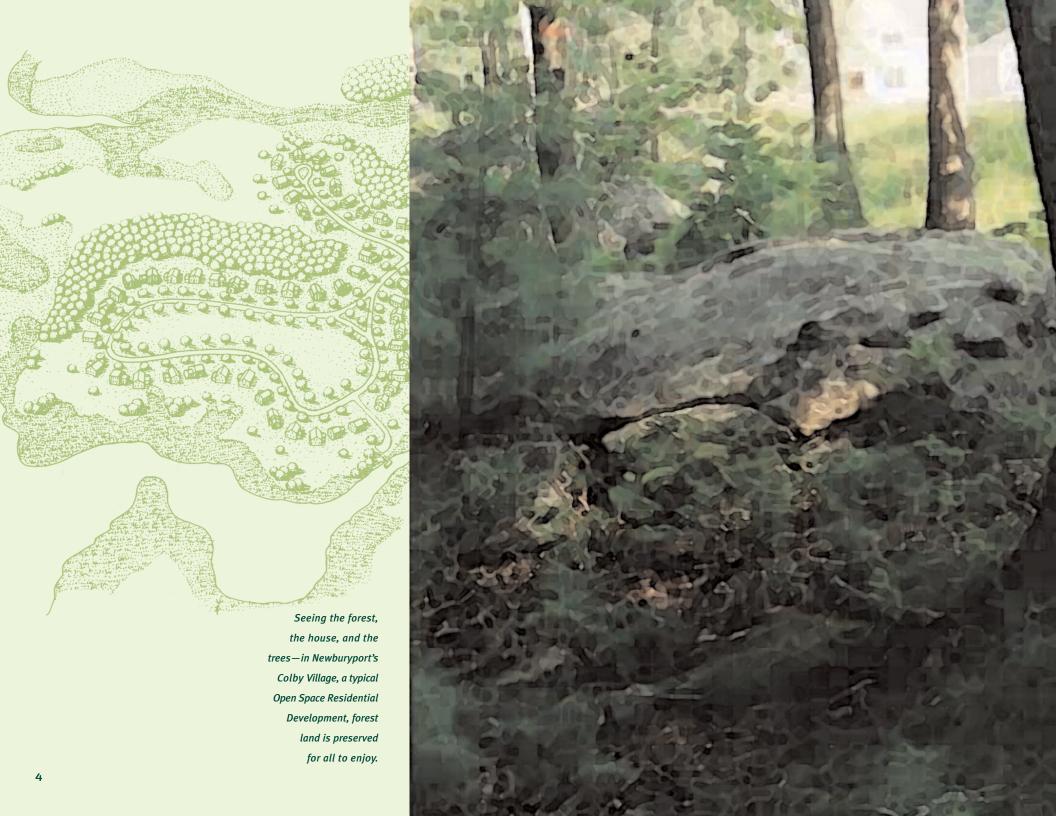
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# The Grass IS Greener in an Open Space Residential Development...

By Arden Miller, CZM

During the 1970s and 1980s, land development within Massachusetts increased by a whopping 45 percent, a stark contrast to the modest 15 percent growth in total population. Previously undeveloped areas that were home to birds and animals quickly became home to subdivisions and their accompanying houses, roads, septic systems, schools, municipal buildings, and businesses. As these developments grew across the state, environmentalists and residents who enjoyed open space became increasingly concerned.

# Bigger Is Better?

In the Massachusetts towns north of Boston—an area including large stretches of wetlands, wildlife habitats, estuaries, and open spaces with unspoiled views of nature—things were no different. During this time, and into the 1990s, local regulations required new homes to be built on lots measuring one acre or more, the intention being to discourage dense development. Ironically, these requirements

actually exacerbated development pressures as houses, and the roadways leading to them, were developed on tracts of land that were often larger than they needed to be. What had once been contiguous open space, home to native flora and fauna, became fragmented parcels where little of the original plant and animal life, and even less of the original character, remained. With these developments came associated municipal costs—more roads to maintain, and more

Take a walk on the preserved side... Siting 66 units of housing on 125 acres, Caldwell Farm housing development (right, and below) in Newbury preserved 100 acres of open space containing fields, forest, and wetlands.





Trends suggest that by 2020, the population in Massachusetts will increase by 8%. By developing land in adherence with Smart Growth principles, the sprawl often associated with increases in population can be minimized.

stormwater runoff from the roads, which created more pollution and more water quality issues. On top of this, there was increasing concern over the loss of open space and the loss of wildlife and bird habitats. With their natural habitats disrupted, species such as wild turkeys and coyotes were suddenly making regular appearances on suburban lawns and town centers. What, if anything, could stop sprawl and preserve habitats?



# Sprawl, Sprawl Go Away...

Enter Massachusetts Audubon North Shore (MA:NS) Director Kathy Leahy and Massachusetts Office of Coastal Zone Managements (CZM) North Shore Regional Coordinator Andrea Cooper. The year was 1996 and they felt strongly that things could not go on as they were. "We recognized that open space was at a premium on the North Shore and that is was not financially feasible for non-profits and municipalities to acquire it, so we began looking at other tools to protect it," Leahy explains. "In other areas of the country, developing land using [Randall Arendt's] Conservation Subdivision Design plan was helping to preserve wildlife habitats and community open space. We were curious to find out if this model would work for us."

To determine if Arendt's Conservation Subdivision Design might be used in place of conventional subdivision design on the North Shore, Cooper and Leahy set up a workshop where Randall Arendt addressed local realtors, land developers, builders, representatives from environmental groups, and members of planning councils and conservation commissions. After this initial workshop, attendees, along with others in the community, were invited to discuss what was and wasn't working within the current subdivision design model with the ultimate goal of coming up with something that would work better.

The first meeting, chaired by Cooper and Leahy, was attended by close to 20 people, all with strong feelings about land use and development. "Those first meetings were difficult, to say the least," Cooper recalls. "The developers didn't want the 'tree huggers' to tell them how to plan a subdivision and the environmentalists didn't want any more development on the North Shore." But despite the disparate, and often polarized views, everyone kept coming back to the scheduled monthly meetings. It took a year of hashing things out for the group to finally agree on something, and that something was that no one was happy with the existing regulatory system. "This first agreement was really the turning point," Cooper states. "After that, we were all determined to work together to find something that would work."

The group, representing 18 different public and private organizations, officially named themselves the Green Neighborhoods Alliance. Between 1996 and 1997, there were many lengthy discussions, but the polarization that marked earlier meetings was no longer there. "People saw that they would have to give in on something they wanted in order to get something else that they wanted more," Cooper recalls. What came out of this year of

compromises was a fully drafted regulatory model, based on Arendt's development designs, that focused on these four steps:

- Identify areas for open space preservation based on environmental and social priorities;
- 2) Site the houses to maximize the number of lots with great views of the protected open space;
- Design roads to minimize their length, width, and cost; and
- 4) Draw the lot lines where they logically fall once the best locations for open space, houses, and roads are all identified.

# Realizing the Values

The Alliance took these core concepts of Arendt's, adding more flexibility and incentives for builders and developers, and christened their bylaw model Open Space Residential Design (OSRD). Of course Rome, and OSRD subdivisions, were not built in a day. After continued discussions and community meetings, the OSRD model was adopted as a regulatory tool by Newbury in 1999. Unlike a traditional subdivision where each individual house has as much land surrounding it as the owner can afford, in an OSRD development, houses are set closer together in what's known as a "cluster development." The land that would ordinarily be surrounding houses is zoned in one continuous expanse that everyone in the community has access to and views of. Ideally, the land with the most historic value, or the land that is home to species that rely on it for sustenance, is preserved. This way, natural scenery is saved and views of historic structures, such as stone walls, cow paths, rural roads, native forests, and, in some cases, even farmland with fruit trees, can be enjoyed by all. The set up is similar to living in a golf course community where, interestingly enough, up to 80

percent of the residents don't golf, but rather choose to live there for the views.

# Style and Substance

In addition to the aesthetic desirability, there are many other benefits. First off, roads can be smaller, and fewer are required. Generally, the access to these houses is along one road, and often that road is a dead end, eliminating excessive through traffic and reducing stormwater runoff from paved surfaces. As for developers, this method streamlines review, both a time and money saver. And site development—aka landscaping and infrastructure—costs are minimized, as most of the terrain is left au natural. For realtors and those who are buying into an OSRD, it's been shown that homes in these subdivisions appreciate more than 12 percent faster than their counterparts in conventional subdivisions.

Al Symes, of Symes Associates, Inc.—a real estate development and property management company—is one of the original Alliance members. "At the time we began discussing open space design, we were one of the first groups in Massachusetts to consider this as a development tool. I'm happy to see that these concepts have spread to a national level since then. Having good planning tools from the start makes everything better in the long run." Symes isn't the only one impressed with the model; in 2004, the Green Neighborhoods Alliance was one of 15 groups state—wide to receive the U. S. Environmental Protection Agency's Environmental Merit Award in recognition of the work they've done to "reshape suburban development to reduce sprawl and minimize environmental impacts."

By 2001, seven communities had passed OSRD bylaws and the seeds of reshaping conventional subdivision design were spreading. And, to this day, the reshaping continues;



Shared driveways and smaller roads in subdivisions like Colby Village mean less road run off and pollution.

as of early 2006, a total of 24 towns have passed bylaws that require developers to use the OSRD model in new developments, and another 12 have added OSRD components to their bylaws. Such developments include Caldwell Farm in Newbury, Old North Mill in Hopkinton, Assabet Estates in Westborough, Canterbury Farms in Amherst, and Bellows Farm in Acton. Each development had unique features and



Got cows? In the Old

North Mill development
in Hopkinton, cow paths
were preserved.



the flexibility of the model allowed for varying lot sizes and creative design, sometimes leading to significant savings. For example, the Old North Mill development in Hopkinton donated 20.24 acres of land to a local land trust, which resulted in tax benefits for the residents, while Assabet Estates in Westborough reduced overall roadway from the conventional 2,453 feet to 1,679 feet, minimizing road maintenance and stormwater runoff treatment costs, all while preserving natural vegetation.

The viability and profitability, not to mention the environmental sustainability, continue to make this adaptable model appeal to developers, environmentalists, and residents. But, for some, that was just the beginning. Having spread the OSRD model, Cooper now convenes a monthly meeting to promote the virtues of Low Impact Development (LID), another tool for keeping Massachusetts cleaner and greener. With LID, the focus is on maintaining natural terrain and nature's water cycle. To give an example, by planting trees, shrubs, and grasses that are native to Massachusetts, individuals and businesses can realize significant savings because these plants are hardy and require no fertilization and little or no watering to survive. In addition, by reducing road width and planting natural grasses on site, less pollution runs into streams and wetlands and groundwater is able to recharge, helping to preserve drinking water supplies. Cooper's monthly LID Working Group is open to representatives from state, federal, non-profit, and private businesses and agencies—basically, any person or group that wants to explore ways to lessen the effects of pollution and development on the environment. "We've laid the groundwork through OSRD. People are more open to creative ways to save the environment and their money." Cooper states. "I think most people are willing to do things differently, but if they don't know there's a problem, they're not going to change things. We just need to keep spreading the word."

# Growin' Native By Arden Miller, CZM

When landscaping in Massachusetts, using indigenous plants and grasses benefits the environment in a number of ways. Thinking locally and growing natively, the Parker River National Wildlife Refuge Visitor Center has created a site that demonstrates some of the aesthetic and environmental advantages of using local plants. The Center was awarded grant money from Massachusetts Environmental Trust (MET) by Massachusetts Office of Coastal Zone Management (CZM) as part of both agency's efforts to promote Low Impact Development (LID). The LID philosophy is to reduce the need for water and fertilizer, hence conserving water and decreasing pollutants through eco-friendly landscaping. (For more on LID principles and practices, see The Solution to Pollution? Connection! The Story of the LID Working Group on page24.)

The Visitor Center, with its entrance in Newburyport, is located off of the road to Plum Island, next to the Parker River National Wildlife Refuge. (The Refuge occupies three quarters of a mile of the eight mile barrier beach, which is an important stop over for migratory birds.) The one-acre parking lot at the Center was landscaped in June of 2004 with close to 700 natives, including bayberry, pitch pines, high- and low-bush blueberry, and Virginia roses (and, yes Virginia, while this variety of rose may not sound native, rest assured, it is!). This less-than-natural setting

of a parking lot mimics what you'd find on a beach: extreme temperature changes, high winds, sand, and salt. Due to the plants' local origin, they are already adapted to these conditions, and adept at helping to anchor the soil, while also acting as a natural filtration system for stormwater. (This last piece is crucial as stormwater runoff can contain all sorts of nitrates and pollutants that, left unfiltered, can end up in local rivers, tributaries, and the ocean.)

As more people become aware of the benefits of LID and Massachusetts towns adopt ordinances and policies to reduce the use of chemical fertilizers, such pilot plantings offer a real-life demonstration of how native plants can do good while looking good. Another consideration that is gaining increased attention, both nationally and locally, is water conservation. While they Bay State is in no way arid, there have been a number of summers when water conservation is not just encouraged, but required. Unlike their non-native counterparts, native grasses and plants can survive during times of feast or famine, making them desirable ecologically, economically, and aesthetically.

The Center's parking lot brings these principles to life, literally, and educates visitors through signage, pamphlets, and their website, www.fws. gov/northeast/parkerriver/nativeplant1.html.

As natives of
Massachusetts, sweet
fern (left) and virginia
roses (above), are able
to withstand New
England temperature

extremes.

Kathryn Glenn, regional coordinator of CZM's North Shore office worked with the Center on the project. "By using only plants that are native to Plum Island, this project illustrates the way native plants adapt to, and thrive in, their natural habitat," Glenn explains. "The Center's lot successfully demonstrates that landscaping can be in harmony with nature."

Nearly 700 native

plants went into the

Parker River National

Wildlife Refuge

Visitor Center's

demonstration site.

# THE URBAN UNDERGROUND

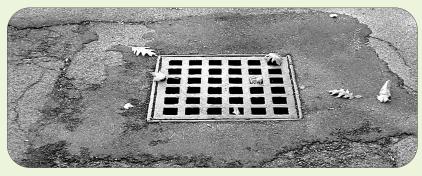
# Fields, Forests, Brooks, and Blacktop - Can't We All Just Get Along?

By Ethan Nedeau

I WAS WALKING IN DOWNTOWN AMHERST one lazy morning when I passed the sign for Tan Brook; on it was the silhouette of a wood duck. But there was no bridge or culvert, no sound of rushing water, and certainly no wood ducks. There was only a print shop, Italian restaurant, parking lot, and busy road. Curious and with time to kill, I wandered across the parking lot, between some buildings, and came to another road with the same sign—but still no wood ducks. Finally I knelt down and peered through stout iron grates at the corner of a parking lot and saw inky water several feet below. **Tan Brook**.

Drain, drain, go away...
OK, we need our drains.
But some of the stuff that
ends up inside them and,
ultimately in our lakes,
rivers, and oceans...
not so much!

I spent the afternoon cutting through neighborhoods, hopping fences, and peering down storm drains to trace Tan Brook from its headwaters (a small pond near a cemetery) to its confluence with the Mill River (near a sports arena). From what I could see, about 80 percent of Tan



photos by Ethan Nedeau

Brook flowed through underground pipes that drained nearly 60 percent of the downtown area and nearby college campus. The brook flowed underneath vast parking lots, roadways, buildings, and athletic

fields. Its waters were seasoned with a concoction of road salt, oil, grease, pizza crusts, dog poop, lawn chemicals, and other urban ingredients. I felt deceived. Living in a progressive and environmentally friendly community, I assumed our natural resources were revered. The Department of Public Works was kind enough to give the drainage system a name (albeit not the most flattering one) and a wood duck silhouette on the sign (a cruel sense of irony). Yet it was unfortunate that a stream that once drained a rich deciduous hillside and supported a diverse community of aquatic insects was now relegated to an underground drainage network, removed from sight and disconnected from our lives.

# DISMANTLING ECOSYSTEMS

One of the greatest threats to natural

ecosystems is mankind's tendency to wipe the natural slate clean when colonizing an area. In the United States, for example, we have cleared land, leveled hills and valleys, filled wetlands, channeled water into engineered conduits, and paved broad areas. This ensures that our structures have solid foundations that vehicles can travel smoothly and at a high speed, and that water and waste are quickly directed toward a convenient depository.

This high-intensity land use has steadily engulfed vast amounts of land throughout the United States. From 1982 to 1997, urbanized land increased by 25 million acres in the contiguous United States (NRI 2001), and the rate of development has continued to accelerate in the last decade. Experts predict that by 2025 there will be 68 million more developed

(roughly the size of Wyoming) and that 25 percent of coastal areas will be developed (up from 14 percent in 1997) (Beach 2002, EPA 2001). Coastal watersheds are already greatly threatened, as coastal counties comprise only 17 percent of the land area of the contiguous United States but contain more than half of the human population (NOAA 1998, Beach 2002). Impervious surfaces—such as roadways, parking lots, and rooftops—now cover more surface area in the United States (nearly 45,000 square miles) than do all remaining herbaceous wetlands. An additional I million single-family homes, 10,000 miles of roadways, and countless other buildings and parking lots will likely be built annually in the coming decade (Elvidge et al. 2004).

In natural landscapes, the air, land, water, and living organisms comprise a dynamic ecosystem driven primarily by the hydrologic cycle. Impervious surfaces break the connectivity between the aboveground and below-ground portions of a watershed. This connectivity is of utmost importance to element and nutrient cycling and to virtually all ecosystem processes, including maintenance of biological diversity. It even affects climate. Therefore, it should not be surprising that impervious surfaces and engineered landscapes that intercept and direct water off the landscape cause myriad environmental problems.

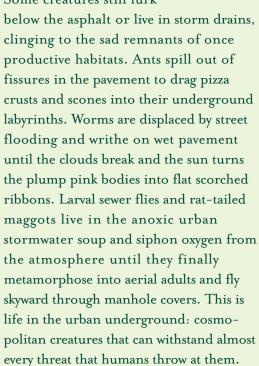
Impaired water quality, loss and degradation of terrestrial and wetland ecosystems, coastal pollution, water shortages, damaging floods, and harm to fish and wildlife populations can be partly or wholly attributed to impervious surfaces and poor water conservation.

Studies have demonstrated that when impervious surfaces cover greater than IO percent of a watershed, freshwater and coastal ecosystems begin to suffer sharp and sometimes irreversible declines in health (Schueler and Holland 2000). Some Massachusetts watersheds have more than 50 percent of the land areas as impervious surfaces, especially in the Boston metropolitan area. Each day, millions of gallons of reusable freshwater are expeditiously removed from local hydrologic cycles rather than being recycled on the landscape. Rainwater and snowmelt are wasted because they run off rooftops, cannot infiltrate pavement, and flow quickly across monocultures of manicured grass. A one-acre parking lot produces 16 times more runoff than a one-acre meadow (Schueler and Holland 2000).

Worse, this wasted runoff leads to concentrated pollutants in water bodies. Surface water is directed toward gutters, which lead to storm drains, which empty into streams, rivers, or the ocean. Urban runoff is responsible for 55 percent of

environmentally impaired ocean shorelines, 46 percent of impaired estuary miles, and 21 percent of impaired lakemiles in the United States (EPA 1998).

Soils that were once alive with roots, microbes, invertebrates, and burrowing vertebrates remain comparatively dormant beneath pavement and buildings in urban areas. Some creatures still lurk





Tan Brook: Neither tan, nor a brook. And not a wood duck in site. Discuss...

# STARTING OVER

Every so often, I find myself daydreaming about how my life could be different if I could start again, armed with a lifetime's



Unfortunately, this message often goes unheard and unseen.

worth of insight and clarity. I do not begrudge the learning process, but it is sad to think that I may get to apply lessons learned along the way only late in life. We build our communities just so—the

ways that we develop and use natural resources evolve tremendously as we learn from centuries of experience. There is a growing awareness of the consequences of land use, urban design, and consumption on our lives and the environment. Urban design and planning is a rapidly evolving field of engineering and applied science, but putting theory into practice is challenging because cities are already built—existing infrastructure and design constrains new creativity. How can we start over?

One major challenge will be to reduce the effects of impervious surfaces and find ways to deal with urban runoff and non-point source pollution. Although the concept of reducing impervious surfaces is alluring to environmentally conscientious people who like to feel grass below their feet and relish the rich smell of earth, there are many practical limitations. Basketballs do not bounce on wood chips. Roller blades come to a rapid halt when people veer into the grass. And most people would not think of taking their sport utility vehicles off road. So how can we increase the porosity of the landscape to retain water and maintain existing infrastructure and preserve our quality of life?

Creative minds continue to explore ways to conserve water and restore ecosystems in an asphalt world, but the complexity can be overwhelming. Ideas range from rooftop gardens and cisterns that trap rainwater, parking lot designs, to regional planning and zoning (including bylaws and ordinances). At a regional scale, planning and zoning dictate where development will occur. At a neighborhood scale, planners focus on the arrangement of different land uses, street layouts, and optimum population densities. At a site scale, the focus on is on construction practices, stormwater designs, buffer widths, and landscaping. It may be impractical to redesign cities altogether-Boston's Big Dig is a testament to the costs involved with urban reconstruction (as of November 2005, nearly \$15 billion had been spent on this effort). But as human populations soar in Massachusetts municipalities and urban sprawl engulfs rural areas, there is ample opportunity to

design efficient environmentally friendly communities that conserve water.

New philosophies named "Smart Growth," "Smart Conservation," and "New Urbanism" guide development in some areas of the country. Smart Growth promotes compact development, reduced impervious surfaces and improved water retention, protection of environmentally sensitive areas, mixing of land uses (e.g., residential, office, and retail), public transportation, support for pedestrians and bicyclists, and other urban design features such as greenways. [Massachusetts Executive Office of Environmental Affairs has produced the Smart Growth Toolkit, a great resource for integrating these principles into local and regional planning; see www.mass.gov/envir/smart\_ growth\_toolkit/index.html.]

Thinking of all the ways to reduce impervious surfaces and conserve water is like standing in a penny candy store with a nickel in your pocket—mouth watering, wistful, and wide-eyed—considering all of the glorious possibilities. If you are like my wife around candy, then you understand that the sadness of not having everything is often stronger than the happiness of having a nickel's worth. The decision is invariably slow and reluctant. But the

need for water conservation is immediate; many of our streams and coastal waters are approaching an environmental tipping point beyond which they will be as woeful as Tan Brook.

Reviving the urban underground will require water: water to soak thirsty soils, water to recharge critical aquifers, and water to sustain streams and wetlands. This calls for a broad, long-term effort by all levels of government, land developers, building material suppliers, private businesses, and not-for-profit environmental groups. Finally, these efforts must be buttressed by a culture of conservation among citizens.

If you do not have the time or wherewithal to join local government or planning boards to effect change at a broad scale, just look around your home and yard for places to begin. I built a small pond in my backyard this summer, intercepting surface runoff before it got to the stormwater drain of the housing development next door. A green frog moved in within days—I have no idea where it came from but my satisfaction was immense. I am digging out the old cement walkways leading to my doorways in favor of wood chips, adding more gardens, and directing rooftop runoff into rain barrels. That

is my contribution for now—rainwater will not reach Tan Brook and be whisked away to Long Island Sound. It will remain close to where it landed and support all the frogs, birds, and thirsty roots on my humble parcel of land.



Ethan is a science communicator, environmental consultant, and graphic artist. He lives amongst pervious and impervious surfaces in Amherst, Massachusetts. Ethan can be contacted through his web site, www.biodrawversity.com.

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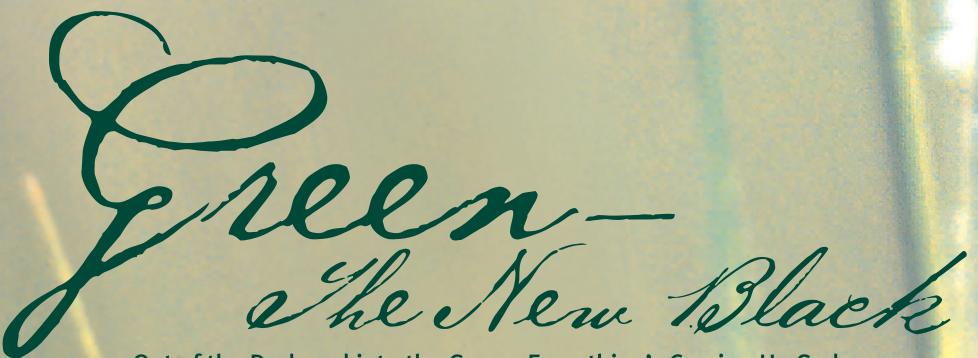
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DANGER: All Roads Lead to Someone's Watershed! Pollutants and other unsavory things go down the drain, and into our waters.

photo by Dave Merrill





Out of the Dark and into the Green, Everything's Coming Up Sedums

By Arden Miller, CZM

What do New York City's Rockefeller Center, the Ford Motor Plant in Dearborn, Michigan, and Boston's Four Season's Hotel have in common? While all well-known institutions, their *raisons d'etre* vary greatly. In Boston, the elegant five-star Four Seasons Hotel is renown for their elaborate high tea service and the rumored celebrity sightings (Mick Jagger! Meryl Streep!), while in the Midwest, the Ford Motor Company's 1,200 acre plant is one of the largest car, truck, and sports utility vehicle manufacturers in the world. And Rockefeller Center is synonymous with New York City's annual internationally broadcast tree lighting ceremony. But despite these vastly different associations, these landmark institutions share one surface area that is the same: green roofs.



photo courtesy of Mathew Carr, Hydrotech

# **Just Add Plants**

What are these green roofs, and where did the idea of planting things atop a building spring from? Simply put, a green roof is created when a traditional rooftop is sealed with a protective waterproof membrane, and then a drainage layer, a minimum of two inches of soil, and plants are added, resulting in a rooftop that is covered in-among other things-green. (For specific details, and types of green roofs, see "WOW-That's Intense!" on page 17.) As for the second part of the question, according to legend, their roots, pardon the pun, go as far back as 600 B.C. with the fabled hanging gardens of Babylon. Considered to be one of the Seven Wonders of the World, the rooftop trees and hanging vines that allegedly graced the famed Mesopotamian palace were created by King Nebuchadrezar to cheer up his foreign-born wife, Amyitis, who missed the greenery of her homeland. These precursors to today's green roofs were made by filling the hollowed out areas on top of terraces with soil and planting trees and vines. Fast forward to more than 2,000 years later and 4,000 miles away where resourceful Icelanders started

using sod as insulation for both their roofs and walls in the mid-I800s. To this day, a number of these sod-covered buildings live on (and you thought vinyl siding was long lasting!). Some, such as the still functioning "sod church" in Vidimyri, Iceland, have even become popular tourist attractions.

### From Beer Gardens to Roof Gardens

Green roofs have been dotting the European landscape since the late 1960s. But nowhere have green roofs caught on faster—or become more common place—than in Germany. Once upon a time, few vacations to Germany were complete without a trip to one of their world renown beer gardens. But today, roof gardens are a far more common site. In the 10 years between 1989 and 1999, German roofing companies installed nearly 350 million square feet of green roofs. And today, it's estimated that Germans have somewhere between 800 million and one billion square feet of green roofs<sup>1</sup>—to put it in a New England perspective, that's the equivalent of 3,300-4,250 Fenway Parks (including the stands!).

Growning greener: The roof top of Manulife Financial in Boston has a variety of native grasses and plants that provide a nice view and help to insulate the building from extreme temperatures.



photo courtesy of Boston City Hall

Close up of sedums on Boston
City Hall's roof top. Due to
their hardiness and resistance
to drought, sedums are often
used in the construction of
green roof tops.

In Deutschland, they feel so strongly about the benefits of dachbegrunungs-that's green roofs to us-that in some cities, such as Hamburg, more than 90 percent of all commercial and residential rooftops are green, and in other cities, such as Studgarden, all new buildings are required to use green roof technology. A driving force behind these requirements is the demonstrated ability of green roofs to retain stormwater after a rainfall; rather than having countless gallons of water flooding the sewage system, or picking up toxins that get washed into rivers and streams (and, when the geography dictates, can ultimately end up in the ocean), the rain is absorbed on rooftops where, even after an intense storm, only a small portion of it ends up as runoff. To defray the costs of treating water that is not collected by a green roof, and to encourage businesses and individuals to replace traditional black asphalt rooftops with green ones, some German cities levy a "rain tax" on non-greened tops.

### Black v. Green

Meanwhile, on this side of the Atlantic, there has been no talk of a rain tax, but green roofs are appealing to more and more people for a variety of reasons. Rick Mattila of Genzyme in Cambridge, Massachusetts, explains their decision to have an extensive green roof installed: "We can see the Charles River right from our

building, and we know that 75 percent of the pollution in the Charles comes from stormwater runoff. This is something we can do to help the environment we live in." Mike Maloney of Maloney Morris Associates has been installing green roofs around New England since 1998. "Every year since I've been in the business, more people have become interested—the word is definitely spreading. From an ecological standpoint, they reduce stormwater runoff and also help with the urban heat island effect," Maloney explains. (For an explanation of the urban heat island affect, please see, "It's Getting Hot Out Here!" page 21.)

For others, going green is an aesthetic or business decision. Matt Carr is a member of the American Society of Landscape Architects, and has worked for Hydrotech, a leading green roof installer in the United States for 15 years and, during that time, has been involved in the scoping of more than 250 green roof projects. "A lot of people are interested in having a green roof because it's a fifth architectural dimension and can give buildings a unique look; it's something special and different. Others just want to know 'When will I see the return on my investment?'" To answer that last question, a series of things need to be taken into account—building size, average outside temperature, type of heating and cooling systems, and

City 'Scapes: Chicago City Hall's award-winning rooftop was planted with 400 kinds of plants and flowers, all native to Illinois.



# Wow—That's Intense! By Arden Miller, CZM

When it comes to rooftops made with veggie toppings, there are two basic kinds: extensive and intensive. Both start with a waterproof membrane to seal the rooftop so that water cannot penetrate, and both include an irrigation layer and growth medium—also known as an overburden—made up of nutrients and soil. Where the rooftops differ is in the amount of growth medium, the filter and irrigation systems, and what's on top.

Basically, anything from three to six inches of growth medium supports what's known as an extensive green roof. These are the rooftops that are not made to be publicly used spaces, but rather to insulate the building from cold and heat, catch stormwater runoff, and help reduce the urban heat island effect. (Other benefits to the extensive roof system can include creating a wildlife habitat area for the birds and the bees, providing insulation from overhead noise, and providing an aesthetically pleasing view.) Extensive green roofs usually weigh between 15 and 50 pounds per square foot and cost between \$10 - 15.00 per square foot to install. It is generally recommended that the plants receive fertilizer and water regularly until they have grown in (usually, this happens within six months of planting them). Once established, unless there is a severe drought and they require watering, they are basically self maintaining. In some cases, professional installers will recommend that the rooftop system include a drip tube so that, in times of excess rain, the roots don't drown.

When a roof has anywhere from six inches to three feet of overburden, it's called an intensive green roof. These weigh in up to 150 pounds for each square foot and can cost up to \$75 per square foot to install. The intensive green roof has all the benefits of the extensive top, plus the ability to hold larger amounts of stormwater runoff, and it can support shrubs and trees in addition to ferns, flowers, and sedums. To ensure that the trees and plants have adequate room for roots, and ample drainage and water opportunities, intensive roofs have more construction layers. Depending on the types of plants selected, and the desired look, an intensive rooftop, like one's backyard or a public park, generally requires grooming, weeding, and fertilizing. These are solid roofs that can support human activity, and they are often designed to be used as outdoor park-like space.

Most installation companies guarantee the integrity of the green roof's membrane, and will replace it if there are any leaks. An annual



photo by Brad Rowe, Michigan State Universit



Top: An intensive rooftop greets diners at this Lansing, Michigan restaurant.
Left: Tulips and grass brighten the views of the Callahoun School's rooftop in New York City.

inspection, for drainage and leaks, is advisable. Be they intensive or extensive, or a combination of the two, with more than 400 types of drought-resistant plants and flowers available, landscaping possibilities are as vast one's imagination.

N.B.: All growth systems vary, depending on the installation company, and these facts and figures are not meant as guidelines for installing your own green roofs, tempting as that may be. For information on professional roof contractors, see www.greenroofs.com/directory.php.

Old Green: A sod church in
Iceland (top) still standing
after nearly 400 years.
New Green: A restaurant
in Wisconsin has a grass
roof that is regularly shorn
by sure-footed goats!



internal settings commonly used—and there is no precise answer. (It is estimated that a green roof can cut cooling costs by 20 to 30 percent.) But one thing is clear: having a green roof reduces costs on both the heating and cooling fronts. When it heats up outside, your traditional blacktop roof absorbs the heat, making air conditioner units put in for overtime when temperatures soar. Conversely, having the extra insulation on the outside—not unlike the sod-covered buildings the Icelanders created 200 years ago-helps keep heat in when temperatures dip. "Most buildings will realize a 33 percent savings in heating and cooling costs after a green roof is installed. In energy cost savings alone, they should pay for themselves in six or seven years. If that isn't enough reason to want one, consider this: the average black asphalt roof requires replacing every 10 to 15 years," Carr adds. While green roof technology is still a relatively new concept, the



photo by Sara Windjue

Rockefeller Center's intensive green roof—in place since the mid-1930s—is still holding up, and the German rooftops that have been in place since the 1970s have never needed replacing.

# But What About the Cost? And Do We Have to Hire a Gardner?

Initial expenditures—on average, a green roof will cost anywhere from \$10-75 dollars/square foot to install, which is about twice the cost of a traditional blacktop roof-are a prohibitive consideration for some. And then there's the question of maintenance. Who wants to weed and prune the rooftop? It is possible, even preferable from an environmental perspective, to have a rooftop installed that requires very little to no maintenance. The plants most commonly used are sedums, which are in the cactus family and naturally require very little by way of water and nutrients to survive, and can withstand high winds, drought, storms, and intense sun. "Most rooftops require some initial attention; during the first year, as they are growing in, you'll want to make sure that the plants are taking and sprouting where you want them to. And, if there is a drought, of course you have to give them some water," Carr explains. An exciting development in the world of native plantings and green roofs for the East Coast area is the work currently being done by Jeff Liecht. A botanist and former professor at Tufts University, Liecht is cultivating a variety of ferns and



photo courtesy of Mathew Carr, Hydrotech

A lot of people are interested in having a green roof because it's a **fifth architectural dimension** and can give buildings a unique look; it's something special and different. P.Matt Carr, Hydrotech

Green and Blue: Looking out of the window at Boston's Manulife Financial, you can see the green roof in the foreground, and Boston Harbor beyond.



photo courtesy of Boston City Hall

Boston City Hall's terrace
(top) has been brightened
by rooftop plantings that were
selected for color and durability.
In Cambridge, Genzyme
Corporation had a green roof
installed to lessen stormwater
runoff to the Charles River.

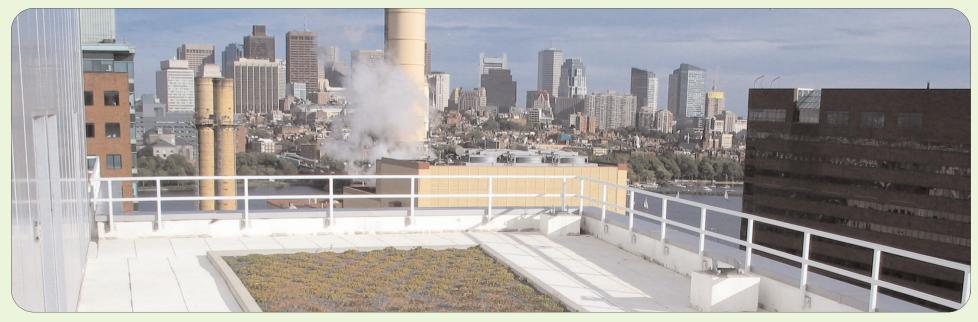
other native New England plants that will offer the potential to go both green and native. (For more on native plants and their benefits, see "*Growing Native*" on page 9.)

Still not convinced? There are a number of reasons to embrace the green side. Besides energy cost savings, stormwater runoff reduction, rooftop longevity, and aesthetics, some other reasons to consider the vegetative topping include:

- Heat island reduction (see article "It's Getting Hot Out Here!," right).
- Habitat for wildlife (plant it, and they will come).
- Noise reduction (the denser, softer surfaces absorb sound).
- Better air quality (plants absorb carbon dioxide, a main ingredient in greenhouse gasses, and release oxygen).

# A Growing Trend

Regardless of motivation, businesses, individuals, and municipalities all over the United States are installing green roofs. City Halls in Atlanta, Chicago, Portland, and Seattle all have green rooftops. (Interesting side note: the rooftop of Chicago's City Hall is planted with 400 different species of plants and flowers, all native to Illinois, and the project won the 2002 American Society of Landscape Architects Professional Merit Award.) Boston's City Hall has undergone a greening too; their 8th and 9th floor terraces are part of a green roof demonstration garden, inspired by the May 2005 Green Roof Conference held in Boston. Across the United States, university campuses-including Harvard, Carnegie-Melon, Massachusetts Institute of Technology, University of Georgia, North Carolina-Chapel Hill, Pennsylvania State, and Michigan State—all have green rooftops on at least one of their buildings. (On some campuses, such as Michigan State and Carnegie Melon, researchers are carefully monitoring plant life and water



# It's Getting Hot Out Here By Arden Miller, CZM

If you were to overhear someone talking about "urban heat island," you might assume they were discussing a t.v. show. Unfortunately, they're not. While the phrase is evocative of a "Survivor" type reality show, urban heat island refers to the unique phenomenon whereby many cities, lacking in greenery and covered in concrete, are 2 to 10 degrees hotter than surrounding lesser developed areas.

### **Cause and Effect**

When you have an area where there is a large collection of tall, dark buildings and parking lots made of asphalt, two things happen: first, the black asphalt rooftops and parking lots absorb the heat (much like a person who is wearing black on a hot summer day); second, the tall buildings trap heat. Adding to the sticky, icky heat felt when temperatures reach high levels are the additional air pollutants—pollutants form faster in hotter weather, and vehicle emissions in urban areas create extra ozone that, without adequate amounts of greenery to give off energizing oxygen, stick in the air and can make it difficult to breath. Combined, this effect is known as urban heat island.

# Hotlanta: A Case Study

Atlanta is often referred to as "Hotlanta" for good reason. Between 1970 and 1980, the

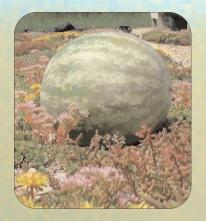
population grew by 27 percent—it was a "hot" place to move to. By 1990, the population increased by an additional 33 percent. Suburbs doubled in size, nearly 350,000 acres of forest were cleared to make way for housing and roads, and dark roofs and pavement took over. And then things got really hot. Meteorologists regularly noted that temperatures inside the city were 10 degrees higher than in the outlying areas. Ten degrees is a lot, especially in a southern city. And, while difficult to prove the exact numbers of oxygen-giving greenery that would need to be planted to completely ameliorate this situation, the more vegetation on the 'island,' the better. When it comes to putting their money where their heat island is, Atlanta's City Hall is leading by example: they've had a 3,000 square foot green roof since 2003. With this roof's high visibility (it's open to the public during business hours and visitors and employees can eat in a cafeteria that overlooks the roof garden), the message that green roofs are functional and beautiful is spreading.

### Hotter than Hell's Kitchen

But it's not just the south that has a heat problem: in New York City, more than Hell's Kitchen can get very, very warm in the summer. And, like Atlanta, the higher city temperatures are attributed to urban sprawl. To address their island's heat island effect, Manhattan's Greening Gotham Organization has formed an alliance with the national environmental organization, Earth Pledge, and together they have created the Green Roof Initiative. One offshoot of this collaboration (which includes city, state, and private citizens) is the green roof demonstration project at Pace University. The U.S. Environmental Protection Agency and Pace University will monitor the effects that the 30,000 square foot green roof—one of the largest in the city—will have on the climate. On a smaller scale, Greening Gotham encourages private citizens to add green to their rooftops by offering the consulting services of experienced pro-green roof professional engineers and architects, often for free. And such grass roots initiatives and collaborations are forming in other cities.

As of early 2006, Boston, Chicago, New York, Portland, Seattle, Washington, D.C., and Toronto are watching more and more green spring up. Someday, with proper planning and planting, "urban heat island" will be nothing more than a reality show and we can choose to watch it, or to change the channel.

<sup>1</sup> Dr. Keith Heidorn, The Weather Doctor, July 1, 2002



retention to add to the growing body of research on the topic, and at the University of Pennsylvania, Professor David Beattie, a long-time advocate of green roofs, teaches a course on the topic and has an outdoor area devoted to their study that is affectionately called "Beattieville.") A number of commercial buildings have gone green, too. In Connecticut, Foxwoods Casino—the largest resort casino in the world—has an extensive intensive green roof, while on the West Coast, headquarters for The GAP outside of San Francisco have been teaming with green since 2001. Lincoln Center in New York City, the largest performing arts center in the world, is pushing the green



Green roofs: Not just for eco-freaks! Dogs and watermelon lovers can appreciate them too, as these two examples from the Michigan State Green Roof Project show. envelope artistically with their plans for a sloping green roof that will be open to the public as part of a multi-million dollar "Avenue of the Arts" renovation project. In Pittsburgh, Pennsylvania, the Heinz 57 Center (yes, the ketchup people!) provide employees with 12,000 square feet of roof meadow and flowering perennials to ponder while thinking up their next condiment campaign. And, closer to home, IKEA, (the Swedish furniture and home accessory giant best known by some as Jerry's furniture store

of choice on Seinfeld), supports 37,000 square feet of green atop its environmentally friendly Stoughton store.

# **LEED By Example**

The Deerfield Academy, a college prepatory school in Deerfield, Massachusetts, plans to make the most of their green roof. The project is expected to be complete in spring of 2006, at which time the students will begin monitoring the types of sedum used for school credit. And, while the students are getting credit for their research, the school will be getting credit for having the roof installed. For developers and builders, using energy-saving techniques such as green roofs can qualify them for Leadership in Energy and Environmental Design (LEED) certification, which leads directly to financial savings through tax credits, and has the added cache of being lauded as an environmentally friendly entity.

# **Everything's Coming Up Roses...**

If rooftops imitate life, they'll never be a bed of roses. But beds of colorful sedums, ferns, native plants, and trees are in our foreseeable future. "More and more people are interested in marrying the ecological and technological benefits with the pretty designs," observes Matt Carr. "As we look to ways to conserve our resources and take care of what we have, green roofs are going to become even more popular. And if you don't care about that stuff, well, they just look good." As the seeds spread, be on the lookout for green. It's the new black.

### Sources

'Is That a Garden On Your Roof?, Newsweek, August 5, 2005

### More Information

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http://www.earthpledge.org/GreenRoof.html

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# When Life Gives You Rain, Make a Raingarden By Betsy Rickards, CZM

Raingardens—known in some circles as bioretention cells—appear on the surface to be a shallow depression containing plants, grasses, and flowers. What distinguishes them from other gardens is their ability to retain water, specifically rainwater, that would otherwise flow over asphalt, pick up pollutants, and ultimately end up in rivers, streams, and the ocean.

And not only do these pretty little retention cells lessen contamination in our waterways; rain gardens also recharge the groundwater supply, which ultimately benefits drinking water supplies. How do they do this?

Well, compared to a traditional lawn, rain gardens soak as much as 30 percent more rain. And by holding the water in their tight little grip, the plants and soils capture the water and sediments and absorb nutrients and pollutants from sources such as fertilizers, pet wastes, and oils. Subsequently, the water that makes its way to local water bodies is significantly cleaner. As an added bonus, this extra retention helps to moderate flooding, which reduces erosion of the banks and shoreline.

Rain gardens can work virtually everywhere. If you have some outdoor space, you can help by

planting one to collect runoff from your roof or, if circumstances allow, to capture water that drains from your driveway or lawn. Rain gardens are very easy to establish on new residential construction. On existing lots, the most difficult work might be in removing the existing grass and plants. Most gardens are created by digging a shallow area in the lawn. (If rain doesn't soak readily into the ground, layering a combination of sand, gravel, soil, and mulch into the garden plot will quickly solve the problem). Next, select hardy native plants (for more on native plants, see "Growing Native" on page 9) with deep root systems and place them in the garden. For an additional benefit, you may choose plants that are attractive to birds, bees, and butterflies. The end result is a beautiful, low maintenance garden that is beneficial to you, the environment, and your community. Give it a try! For a user friendly guide on designing and building a rain garden on a residential site, visit: http://clean-water. uwex.edu/pubs/raingarden/rgmanual.pdf.

I beg your pardon, what is a rain garden? These shallow depressions filled with plants benefit the environment in many ways. Left: The anatomy of a rain garden. Right: Rain garden in action.



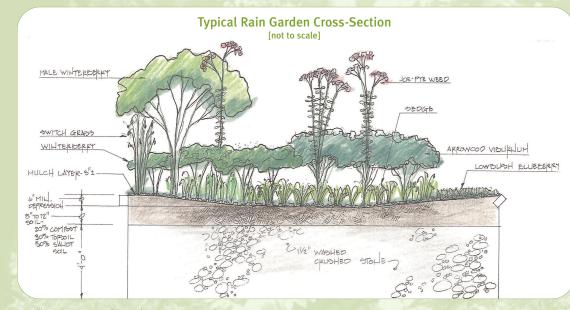


illustration courtesy of Comprehensive Environmental Inc.

# Solution to Pollution? Connection!

# The Story of the LID Working Group By Anne Donovan, CZM

It all started with a conversation between colleagues. In 2003, Andrea Cooper (then the North Shore Regional Coordinator for the Massachusetts Office of Coastal Zone Management [CZM]) and Vicky Gartland (then a Hydrologist with the Massachusetts Department of Conservation and Recreation [DCR]) were musing about what, if anything, they could do to stem the Bay State's sprawling development patterns by promoting this new-to-Massachusetts idea—Low Impact Development (LID). Being practical (and connected), they decided the first step was to gather a group together that could promote LID concepts. The goal was to evaluate what scientific, technical, and outreach resources were needed to promote LID in Massachusetts; identify what already existed; and determine what gaps remained.

Cooper took over as coordinator of this ad hoc conglomeration of about 25 interested and active participants. Originally, those with a technical focus and those with an outreach focus met separately, talking among themselves about the resources that were available and the resources that were needed. Once the outreach group identified that one of the biggest gaps was technical assistance materials, however, the group decided to become one—the LID Working Group—to overcome the obstacles involved in effectively implementing LID at the local level together.

The enthusiasm was infectious as collaborators constructively shared information. In one of its first tasks, the group developed a spreadsheet that served as an LID wish list, complete with what was already being done to fill the needs. The simple effort had big dividends. Within months, LID Working

Group members were applying for (and receiving) grants to complete projects to fill in the spreadsheet holes. Specifically:

- DCR received a \$1 million Targeted Watershed grant from the U.S. Environmental Protection Agency (EPA) for pilot projects to demonstrate the feasibility of LID and water conservation techniques in the Ipswich River Watershed.
- The North and South Rivers Watershed Association received a Section 319 Grant from the Massachusetts

  Department of Environmental Protection (which administers these EPA funds) to produce a Massachusetts edition of the national LID video called Reining in the Storm.
- The Boston Metropolitan Area Planning Council, in coordination with the I-495 MetroWest Corridor Partnership, received EPA funds to develop fact sheets, model bylaws, and other materials for an LID Toolkit, which is available online at http://www.mapc.org/LID.html.

For the first six months or so, the LID Working Group focused on updating each other on the flurry of LID activity happening in the state. Over time, however, this information exchange began to take place through group emails, while the meetings began to focus on educating members on different aspects of LID. The goal was to identify issues and obstacles from the diverse perspectives of the different members to resolve problems before the LID techniques were promoted outside the group. Topics covered have included: examining design criteria, methodology, and assessment data regarding the effectiveness of LID methods; green roofs; permeable pavers; bioretenion; and vegetated filter strips.

Many in Massachusetts
have become involved in
using and promoting Low
Impact Development (LID)
principles to help lessen
the negative effects of
environmental pollutants.

The collaboration and communication have lead to resounding success. LID Working Group members are:

- Actively promoting model LID bylaws—five communities have bylaws in place while another 18 are preparing to adopt bylaws as of May, 2006.
- Spreading the word about effective LID models in Massachusetts, including an ambitious project in Cohasset to retrofit 52 catch basins with bioretention cells, complete with a community demonstration in the town center that shows how the cells look from the beginning of the installation to full grow out.
- Assisting the Massachusetts Environmental Policy Act Unit in ensuring that LID practices are considered for use in major development projects, such as the IKEA furniture store in Stoughton.
- Reaching local officials in LID workshops and seminars (500 so far and still counting).

The LID Working Group now has more than 100 members, including representatives from: local, state, and federal agencies; conservation organizations and watershed associations; private law, planning, and engineering firms; developers and landscape architects; regional planning agencies; the University of Massachusetts; the University of New Hampshire; and the National Association of Home Builders. This true public-private partnership has resulted in a real pooling of resources, connecting those with funding and expertise with those with implementation strategies.

And it all started with a conversation.

For details on the LID Working Group, contact CZM's Coastal Smart Growth Coordinator, Andrea Cooper, at andrea.cooper@state.ma.us or (617) 626-1222.

# More than 100 and Still Counting

On July 19, 2005, the membership of the LID Working Group officially reached 100, and membership continues to grow! As of press time, here is the complete list of member organizations: 495/MetroWest Corridor Partnership; A.D. Makepeace Company; Agresource; Allsopp Design; Ambient Engineering; American Hydrotech, Inc.; Anderson & Kreiger LLP; Boston Society of Architects; Buzzards Bay Project; Charles River Watershed Association; Cities of: Newburyport and Salem; Comprehensive Environmental Inc.; Conservation Law Foundation; Eight Towns and the Bay; Environmental Business Council of New England, Inc.; Essex County Community Foundation; GeoSyntec Consultants; Great Meadows LLC; greenGoat; Groundwork Lawrence; Horsley Witten Group; Lawrence Community Works; Low Impact Development Center; Massachusetts: Department of Conservation and Recreation, Department of Environmental Protection's Bureau of Resource Protection (Stormwater, Wastewater Management, and Wetlands Sections), Department of Fish and Game, Department of Housing and Community Development, Environmental Policy Act Unit, Executive Office of Environmental Affairs, Office of Coastal Zone Management, Office of Community Development, Riverways Program, STrategic Envirotechnology Partnership, and Water Resources Commission; Massachusetts Audubon Society; Massachusetts Association of Conservation Commissions; Massachusetts Bays Program; Massachusetts Watershed Coalition; Merrimack Valley Planning Commission; Metropolitan Area Planning Council; MetroWest Growth Management Committee; Miller Microcomputer Services; Nashua River Watershed Association; New England Civil Engineering Corp.; Norfolk Ram Group, LLC; North and South Rivers Watershed Association; North Shore Regional Conservation Commission Network; Patriot Resource and Conservation Area; Rainwater Recovery Inc.; Rubin and Rudman LLP; Salem Sound Coastwatch; Spear and Associates; Symes Associates, Inc.; The Green Round Table; The Neve-Morin Group, Inc.; Towns of: Andover, Cohasset, Duxbury, Framingham, Franklin, Gardner, Groton, Ipswich, Kingston, Littleton, Marshfield, Norwell, Plymouth, Southborough, and Topsfield; U.S. Department of Agriculture and its Natural Resources Conservation Service; U.S. Environmental Protection Agency's Region 1: National Pollutant Discharge Elimination System Storm Water Permit Program, Office of Wastewater Management, Office of Communities and Smart Growth, and Office of Wetlands, Oceans & Watersheds; U.S. Senator John F. Kerry's Office; University of Massachusetts; University of Massachusetts Extension; University of New Hampshire Stormwater Center; Wachusetts Working Landscape Partnership; Waquoit Bay National Estuarine Research Reserve; Weston & Sampson Engineers, Inc.; and Woodard & Curran.

# By Gosh, It's a Bylaw - Changing the Way Towns Are Developed through Town Meeting

By Andrea Cooper, CZM

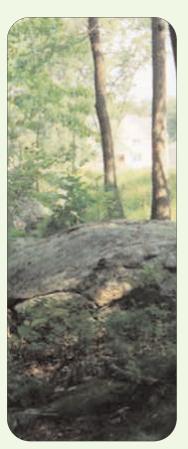


photo by Andrea Cooper

Bylaws protect open space and preserve views like this one in Colby Village. Open Space Residential Design (OSRD) is an important component of "Smart Growth" that, when incorporated into a local bylaw, paves the way for developers to design and build new residential subdivisions that reduce the impacts of stormwater runoff, preserve open space, and protect unique habitat.

As one can imagine, introducing a concept that changes the way subdivisions are built and land is used—not to mention getting towns and cities to buy into it—takes a lot of time and planning. Between 2000 and 2005, the "Green Neighborhoods Alliance" championed the OSRD model to 19 towns and two cities in Massachusetts and all adopted bylaws (or, in the case of cities, ordinances). This statistic on its own is impressive enough for people to ask us, "How did you do that??"

To answer that question, we need to begin where it ends: the Town Meeting. Rarely found outside of New England, these are meetings where residents decide upon issues that will impact their lives. (For a comprehensive explanation of Town Meetings, see What Is a Town Meeting? page 29.) If you are a registered voter within a Town Meeting town, you can think and act locally by just following established practices for placing an article on the ballot. (And you can have a say in the ballot's outcome.) As the history of Town Meetings in Massachusetts demonstrates, however, there is rarely such a thing as "just," at least not when it comes to implementing real change or passing bylaws that will affect how people can develop and use their property.

So where to begin? If you're committed to seeing your article become a bylaw, you carefully lay the groundwork for at least a year prior to even bringing it up for vote in Town Meeting. As CZM's North Shore Regional Coordinator, and founding member of the Green Neighborhoods Alliance, I learned, thanks to shared wisdom of many others, how to get bylaws passed that, quite literally, have changed the face of several North Shore communities. When attempting to get a bylaw passed, the most important thing is to develop an outreach strategy prior to the Town Meeting. You don't want to be on the defensive. By the time your bylaw is brought up as an article for voting, you want to be sure it's going to pass.

To do this, you need to find out who the towns' movers and shakers are. If they have issues with your article, invite them to attend a public forum where the issues will all be addressed. When they understand your article, ask them to vocalize their support to neighbors and friends. Do be careful of the people who come "out of the woodwork" to support you. Remember: just because someone is eager does not guarantee they'll be an asset to your cause. Once the prospective bylaw has been brought into public consciousness, hold public forums (any resident can do this in a library or other public building and it allows people to express concerns and ask questions).

It's really important to listen carefully to people's concerns; you want to find out what your obstacles are and who needs to have their obstacles addressed. It's also important

know which community institutions need to be on board—the Historical Society, the Neighborhood Association, Mother's Against Drunk Driving, the Coffee Klatsch at the local diner—in order for something to pass. You can't just generically address different factions, you have to figure out each groups' specific concerns and allay their fears by explaining how your proposal will help rather than harm their life and the community.

When it comes to outreach, it's crucial to have a strategy to reach as many people as possible. Use the press—Letters to the Editor in the local newspaper is a great forum, people actually read those, especially in small towns. You need to

need a fancy brochure—just one that clearly explains the benefits. Anyone can hand out flyers at the town's busiest spots, like in front of the post office and the town recycling center—and don't forget those school events!

In several towns where we worked to pass articles, the recruitment of those who would be directly affected by OSRD bylaws was critical. After key developers came to understand that this new kind of zoning would give them design flexibility, they became advocates of the plan and brought its message to others in their field. They helped immensely by being able to answer their peer's questions from a business and development perspective. I cannot emphasize enough how important it is to have those directly

It's important to know which community institutions need to be on board...

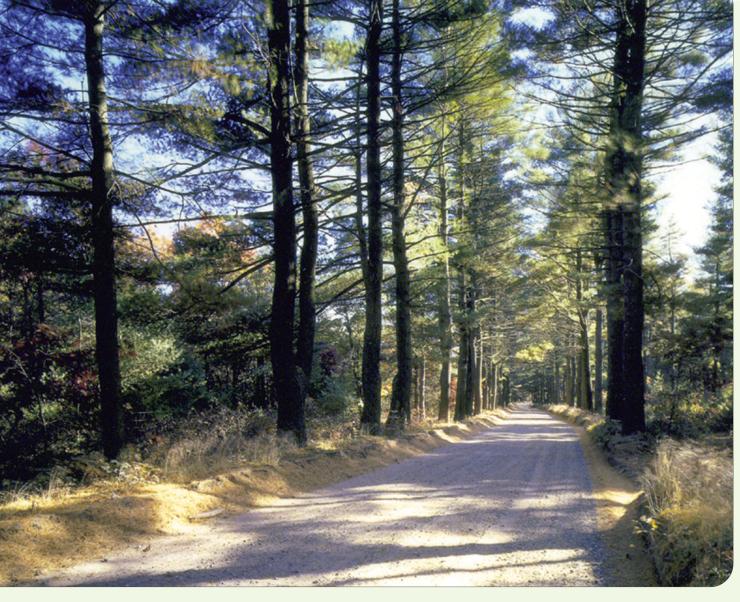
You can't just generically address different factions; you have to figure out each group's specific concerns and allay their fears by explaining how your proposal will help...

get the word out and explain the positive benefits of your bylaw to people. If they don't know how it's going to help them, they aren't going to care if your article gets passed or not. You need to make them aware, make them care. If a developer thinks a part of your proposed bylaw is going to make things more difficult, you need to research that and outline the positive benefits they'll experience.

Along with Kathy Leahy of MassAudubon, North Shore developers, planners, and the Metropolitan Area Planning Council, we developed and distributed OSRD brochures and made presentations to everyone from neighborhood associations to the local chamber of commerce. You don't

involved promoting the message. It's one thing for environmentalists to say, "We need to preserve the nice land for the birds!," but when you can get someone who's not a bird lover to explain the benefits of having preserved land in a community in terms of increased property values, adding buffers to existing neighborhoods, and shorter roadways for the town to maintain, those who might not care about the birds will listen.

Before Town Meeting, it's a good idea to hold a second public meeting just to make sure that all issues and potential issues have been addressed. Open with a statement explaining how this particular bylaw resolves formerly identified issues.



The Long and Historic Road: In Pinehills subdivision in Plymouth, this historic road was preserved. Have a cheat sheet and don't be afraid to refer to it. You don't want to forget to address any of the concerns that have been brought up previously or you'll lose your case before you even begin. In the case of OSRD, we integrated our environmental message with public health (preserving drinking water supplies), economics (cost-effective for the developer and taxpayers), and social (providing the community with walking trails and

open space to meet and socialize in)—in other words, we had something for everyone so the message connected.

After you've done all this, and feel confident that your article has enough support to pass, it's Town Meetin' time! Be sure to hand out fact sheets at the start of Town Meeting (they'll help refresh people's memory and give them something to do while waiting). When it's time to bring the article up for a vote, recapitulate your message (don't forget the cheat sheet!) and allay concerns. If at any time you sense a negative vote, it's time to exit gracefully. Remember: it will be easier to say, "I've heard your concerns and I move to postpone the vote..." than to reverse a negative vote.

Town Meetings are a great place to affect change. The average person can make a profound difference in their community. All you need is a plan, a quorum, and an issue you feel passionate about.



Andrea Cooper is the Smart Growth Coordinator for the
Executive Office of Environmental Affairs and Massachusetts
Office of Coastal Zone Management. She continues to champion
OSRD and other principles that protect the environment, preserve
open space, and reduce pollution in Massachusetts.

# What Is a Town Meeting? By Arden Miller, CZM

Like pahking the cah in Havahd Yahd, Big Dig ice cream, and the Evacuation Day holiday (aka Saint Patrick's Day in Baaahston), Town Meetings as a form of local government are rarely found outside of New England. For communities that consider themselves to be towns—a definition based not on size, by the way, but on the municipality's charter—the Town Meeting form of government is mandatory. (In Massachusetts, a city form of government can only be adopted by a community with a population of 12,000 or more, but an area with more than 12,000 residents can still call itself a town and practice the Town Meeting form of government if it so desires. Confused? Yeah, well welcome to Massachusetts!

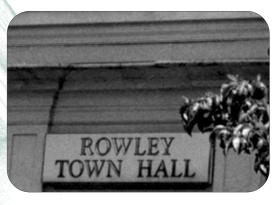
# Open v. Representative

There are two distinct types of Town Meetings: Open Town Meeting and Representative Town Meeting. The Open Meeting is for towns with 6,000 or fewer residents. In this forum, the Board of Selectmen (the group of officials elected to administer the public business of a New England town) will call the meeting by issuing a warrant (i.e., a list of items known as articles, to be voted on). Articles are to Town Meeting what Bills are to the State Legislature and, if they pass, they become a locally enforceable

bylaw. All of the town's registered voters are welcome to attend and vote on all articles. For the towns with 6,000 or more residents, the Representative Town Meeting is the norm (any town can elect to have the Open Meeting, but few in the larger-than-6,000-residents category do). In the Representative Meeting, votes are cast by those elected by the townspeople to be Town Meeting Members. (Not unlike how a U.S. Representative would vote on behalf of their constituents in Congress.) A town could have as few as 45 Town Meeting Members, or, as is the case with Framingham (the state's largest town), as many as 216 Town Meeting Members.

# Special or Annual?

All towns and city's that have the Town Meeting form of government have an Annual Town Meeting (in many towns, this is more commonly known as the Annual Budget Meeting), held sometime between February 1 and June 30. Since towns' fiscal years begin on July 1, this meeting is where the town resolves any leftover financial issues and then approves the next year's budget. The meeting may also include non-budgetary items, such as articles on the town's zoning bylaws. An article can get brought up for voting through a variety of channels,



Town Hall—the hottest spot to motion, second, and vote in town.

including the request of a specific town department (e.g., the water and sewer commission), or through a petition signed by 10 or more of the town's registered voters.

The second type of meeting is the Special Town Meeting. These are held whenever necessary to deal with issues that can't wait until the Annual Meeting. For an article to be considered for a Special Town Meeting, a petition needs to be signed by either 20 percent of the town's population, or 200 people, whichever is the lower number. When voters call for a meeting through a petition, the Selectmen have 45 days to hold a Special Town Meeting.

Annual, Special, Open, or Representative: Town Meetings are an effective way for citizens in New England to affect change.

# Planning for the Changing Face of Ocean Use

By Kate Killerlain Morrison, CZM

No discussion of "smart growth" would be complete without mention of the growing development pressures to one of the most important and sensitive places in the Bay State: our ocean waters. Advances in construction technology together with a variety of impediments to land-based locations have made offshore siting an increasingly attractive and viable option for a number of projects, particularly energy-related facilities, such as Liquified Natural Gas (LNG) terminals and pipelines and wind turbines.

In contrast with land-based projects, the offshore "real estate" in question consists of tidal flats, navigable waters, and submerged lands where ownership is vested in the state and held in trust for the public. As the demand for the use of public trust resources increases, balancing between competing public interests becomes

more difficult. The recent proposals and accompanied debate over the LNG terminals in Massachusetts Bay, and the Cape Wind proposal in Nantucket Sound, exemplify this challenge. Here, the desire to expand renewable energy resources, and to site those facilities offshore, compete with a desire to preserve access to prime fishing grounds,

protect unobstructed views, and preserve recreational interests. How do we balance competing public values offshore?

### The Status of the Status Ouo

Despite the abundance of strong environmental statutes and regulations in Massachusetts, limitations exist in the current ocean management approach. Governance structures for ocean resources have historically been focused on individual resources or activities, such as the maintenance of navigation channels, management of commercial fishing, regulation of ocean disposal, and protection of whale migration areas. Jurisdictional boundaries, such as the dividing line between state and federal waters (which is typically three miles offshore), complicate the situation further. Comprehensive approaches to ocean management have been difficult to develop, due to the complexity of resources

involved, their often migratory and multi-dimensional characteristics, and the tensions created by the competing economic and social interests.

As a consequence, regulatory review of development proposals in the offshore is reactive. Opportunities for a planning process that would allow for early identification of measures for better siting, performance standards, and mitigation are limited. Given that the demand for ocean resources is likely to increase, it is imperative that managers be able to take a proactive and more comprehensive approach.

### Massachusetts Takes Initiative

Current debates about offshore proposals point out the necessity of ensuring that offshore development can be guided to meet commercial, recreational, aesthetic, and ecological needs. In the past two decades, several states, including Oregon, Florida, and California, have completed various levels of ocean management planning and have passed laws regulating activities in the nearshore and coastal areas, such as those that ban bottom trawling and prohibit the discharge of waste from cruise ships. But, until March of 2005, when Governor Mitt Romney and Senator Robert O'Leary introduced legislation that authorizes the Secretary of Environmental Affairs to prepare and implement an Ocean Plan, no state had attempted to manage large-scale offshore stationary uses of ocean resources.

Prior to introducing this innovative legislation, Governor Mitt Romney initiated the Massachusetts Ocean Management Initiative in 2003, spearheaded by the Massachusetts Ocean Management Task Force (Task Force). After an intensive planning process, the Task Force, made up of 22 members from the public and private sector, published Waves of Change: The Massachusetts Ocean Management Task Force Report and Recommendations. The Task Force's overarching recommendation called for a statutory



From wind turbines to aquaculture to Liquefied Natural Gas (LNG) vessels, many wish to use the ocean's valuable real estate.

framework for comprehensive ocean management, which lead to the introduction of the Massachusetts Oceans Bill legislation. As of this writing, the legislation has been favorably reported out of the Joint Committee on Environment, Natural Resources and Agriculture and is undergoing review by Ways and Means. While changes to the legislation may result from the ongoing legislative deliberations, key elements include:

- The Ocean Plan shall apply to all state waters, as well as areas in federal waters "that are functionally connected to state waters," and shall guide development into areas that are most appropriate based on existing uses, natural resource values, and development trends.
- Public participation shall be on-going and begin early in the scoping process, and shall include regional meetings and comment periods, as well as the opportunity to appeal an adopted Ocean Plan.
- A strong baseline assessment of natural, social, cultural, historic, and economic information shall be developed to inform planning efforts.
- The Ocean Plan shall articulate management measures, including performance standards, mitigation requirements, and use limitations, as may be applicable to specific geographic areas, to balance resource protection and economic development.
- Certain offshore uses, like the discharge/disposal of waste, certain types of sand mining, and commercial advertising, shall generally be prohibited, with additional restrictions applying (e.g., no offshore electric generating facilities) to the five Ocean Sanctuaries in Massachusetts.
- Other offshore uses, such as sand and gravel mining for beach nourishment, pipelines and cables, aquaculture, and the construction of docks and piers, shall be allowed, subject to the provisions of the Ocean Plan.
- Ocean Plans shall be reviewed every five years to ensure that the best available information is incorporated to accommodate new development issues and to reflect changing human needs.
- While fisheries resources will continue to be managed through the Division of Marine Fisheries (DMF), the Ocean Plan shall be integrated into the existing management framework.

Building on momentum generated by the Ocean Management Initiative, the Massachusetts Office of Coastal Zone Management (CZM), DMF, and the Department of Environmental Protection (DEP) have been working together to explore and collect information that will help provide a baseline for more effective ocean planning. Projects that are currently underway to expand the information base include seafloor mapping and delineation of habitat types; data collection on historic, current, and emerging human use patterns offshore; and an assessment of the Massachusetts ocean and coastal economy. This group will also be developing a planning framework to be used by both project applicants and project review agencies to provide a more consistent and efficient review of proposals.

As many of the "smart growth" concepts discussed in this edition of Coastlines illustrate, managing development appropriately allows

for both the use and protection of public resources in a way that benefits both the economy and the environment. Through the efforts of the Massachusetts

Ocean Management Initiative, the Bay State has taken the first steps toward embodying "smart growth" within the ocean governance structure to protect the vital public trust resources that are so important to the common heritage, livelihood, enjoyment, and long-term prosperity of Massachusetts.

For more information on the Massachusetts Ocean Management Initiative, please visit: http://www.mass.gov/ czm/oceanmanagement/index.htm.



photo by Tom Skinner

Wind energy yesterday and today: In the 1800s, windmills were used to collect salt in Provincetown, Massachusetts (illustration). These days, they're more commonly used to generate wind energy.